CLAIMS

What is claimed is:

1. An image processing device comprising:

a look-up table (LUT) storing sample outputs from an output range of a transfer function, wherein the transfer function maps sample inputs from an input range of the transfer function to the sample outputs, the sample inputs being distributed so that more sample inputs are associated with a first region of the transfer function than a second region of the transfer function; and

an address module to calculate an index into the LUT based on image data.

2. The image processing device of claim 1, further comprising an interpolation module to calculate transferred image data using the sample output in the LUT addressed by the index.

3. The image processing device of claim 1, further comprising a plurality of additional LUTs, one LUT to correspond to each color channel used by a color space.

4. The image processing device of claim 3, further comprising a color filter to determine a color of the image data and to select one of the plurality of LUTs based on the determined color.

5. The image processing device of claim 2, wherein the interpolation module also uses the image data to calculate the transferred image data.

6. The image processing device of claim 1, wherein the address module calculates the index by accessing a region pointer based on a first part of the image data, and combining the region pointer with a second part of the image data.

7. The image processing device of claim 6, wherein the first part of the image data comprises the first two bits of the image data that determine a quartile, the region pointer comprises a quartile pointer that addresses the first sample output mapped from a sample input in the quartile, and the second part of the image data indicates the address of the indexed sample output within the quartile.

8. The image processing device of claim 6, wherein the transfer function has four regions, the first and second regions each being one of the four regions, and the region pointer identifies with which of the four regions the image data is associated.

9. The image processing device of claim 2, wherein the transferred image data comprises companded image data.

10. The image processing device of claim 2, wherein the transferred image data comprises gamma-corrected image data.

11. A digital camera for capturing digital video or still images, the digital camera comprising:

a sensor to convert light into image data;

a look-up table (LUT) storing sample outputs from an output range of an image processing transfer function, wherein the image processing transfer function maps sample inputs from an input range of the image processing transfer function to the sample outputs, the sample inputs being distributed so that more sample inputs are associated with a first region of the image processing transfer function than a second region of the image processing transfer function; and

a battery to power the sensor and the LUT.

12. The digital camera of claim 11, further comprising an address module to calculate an index into the LUT based on image data.

13. The digital camera of claim 12, further comprising an interpolation module to calculate transferred image data using the image data and the sample output in the LUT addressed by the index.

14. The digital camera of claim 11, further comprising a plurality of additional LUTs, one LUT to correspond to each color channel used by a color space.

15. The digital camera of claim 14, further comprising a color filter to determine a color of the image data and to select one of the plurality of LUTs based on the determined color.

16. The digital camera of claim 12, wherein the address module calculates the index by accessing a region pointer based on a first part of the image data, and combining the region pointer with a second part of the image data.

17. The digital camera of claim 16, wherein the transfer function has four regions, the first and second regions each being one of the four regions, and the region pointer identifies with which of the four regions the image data is associated.

18. The digital camera of claim 11, wherein the image processing transfer function comprises a gamma-correction transfer function.

19. A method of programming a look-up table (LUT), the method comprising:

generating a transfer function to process image data;

defining a high curvature region of the transfer function, the curvature of the high curvature region being above a threshold;

allocating more sample inputs to the high curvature region of the transfer function than to a low curvature region of the transfer function, the curvature of the low curvature region being below the threshold;

generating a plurality of sample outputs by mapping sample inputs to the sample outputs using the transfer function; and

populating entries of the LUT with the plurality of sample outputs.

20. The method of claim 19, wherein defining a high curvature region of the transfer function comprises dividing an input range of the transfer function into four regions and measuring the curvature of the transfer function in each region.

21. The method of claim 19, further comprising indexing the entries of the LUT based in part on the region of the transfer function from which the sample input associated with the sample output in each entry is.

22. The method of claim 19, further comprising receiving image data, and processing the image data using the LUT.

23. The method of claim 19, wherein the fixed number of entries is N, defining a high curvature region of the transfer function comprises dividing the input range of a transfer function into M regions, and allocating more sample inputs to the high curvature region of the transfer function than to a low curvature region of the transfer function comprises selecting N sample inputs to be allocated between the M regions in a flexible manner, wherein at least one high curvature region is allocated more sample inputs than at least one low curvature region.

24. A method comprising:

receiving image data, the image data being input for a transfer function, the transfer function mapping an input range to an output range;

using a first section of the received image data to identify a region of the input range of the transfer function to which the received image data belongs;

selecting a second section of the received image data based on the identified region;

addressing an entry of a look-up table (LUT) using the first and second sections of the image data; and

calculating a transferred image data by using the addressed entry and a residual section of the image data.

25. The method of claim 24, wherein selecting a second section of the received image data comprises selecting a number of bits able to identify each entry of the LUT associated with the identified region.

26. The method of claim 25, wherein addressing the entry of the LUT comprises accessing a pointer identifying a set of entries of the LUT associated with the identified region, and using the selected number of bits of the second section to identify one of the set of entries.

27. The method of claim 24, wherein calculating the transferred image data comprises interpolating between the addressed entry and an adjacent entry using the residual section of the image.

28. A machine-readable medium that stores data representing instructions that, if accessed by a processor, will cause the processor to generate a transfer function to process image data, define a first region of the transfer function, allocate more sample inputs to the first region of the transfer function than to a second region of the transfer function, generate a plurality of sample outputs corresponding with the sample inputs by sampling the transfer function, and populate the entries of the LUT with the plurality of sample outputs, wherein the first region has greater curvature than the second region.

29. The machine-readable medium of claim 28, wherein the instructions are such that the definition of the first region of the transfer function comprises dividing an input range of the transfer function into four regions and measuring the curvature of the transfer function in each region.

30. The machine-readable medium of claim 28, wherein the medium has further instructions which cause the processor to index the entries of the LUT based in part on the region of the transfer function from which the sample input associated with the sample output in each entry is.

31. The machine-readable medium of claim 28, wherein the instructions are such that the fixed number of entries is N, the definition of the first region of the transfer function comprises dividing the input range of a transfer function into M regions, and allocating more sample inputs to the first region of the transfer function than to a second region of the transfer function comprises selecting N sample inputs to be allocated between the M regions in a flexible manner, wherein at least one high curvature region is allocated more sample inputs than at least one low curvature region.

32. A machine-readable medium that stores data representing instructions that, if accessed by a processor, will cause the processor to receive image data, the image data being input for a transfer function, the transfer function mapping an input range to an output range, use a first section of the received image data to identify a region of the input range of the transfer function to which the received image data belongs, select a second section of the received image data based on the identified region, index an entry of a look-up table (LUT) using the first and second sections of the image data, calculate a transferred image data by using the addressed entry and a residual section of the image data.

33. The machine-readable medium of claim 32, wherein the instructions are such that the selection of the second section of the received image data comprises selecting a number of bits able to identify each entry of the LUT associated with the identified region.

34. The machine-readable medium of claim 33, wherein the instructions are such that the indexing of the entry of the LUT comprises accessing a pointer identifying a set of entries of the LUT associated with the identified region, and using the selected number of bits of the second section to identify one of the set of entries.